REMARKS

Claims 1 – 16 are now pending in the application. The Examiner is respectfully requested to reconsider and withdraw the rejection(s) in view of the amendments and remarks contained herein.

SPECIFICATION

The Examiner requested clarification of the Title, indicating that the Examiner's objection to the Title in the official action mailed September 27, 2004 was based on the Title being "Engine Misfire Detection," which the Examiner indicates was taken from the bibliographic data sheet. Since an Application Data Sheet was not filed, applicants are unsure to what the reference to the bibliographic data sheet pertains. In any event, the proper title is "Engine Misfire Detection Using System Identification Technology." In this regard, applicants found that the title on the Application cover sheet and the title on the first page of the specification were different, with the latter being "Engine Misfire Detection." Applicants have therefore amended the Title on the first page of the specification to be "Engine Misfire Detection Using System Identification Technology."

REJECTION UNDER 35 U.S.C. § 103

Claims 1 – 10 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Scherer et al. (U.S. Pat. No. 5,888,204). This rejection is respectfully traversed. But applicants will first address new claims 11 – 16 and the reasons why they distinguish over Scherer et al. and then claims 1 – 10.

New claim 11, the new independent claim, is directed to a method of detecting misfire in an engine. It requires, *inter alia*, drawing a nonlinear, dynamic model of a firing system for the engine using engine speed, manifold absolute pressure and a firing event signal; simplifying the nonlinear, dynamic model by separating it into an engine firing event estimator function and an engine load compensator function; expressing the engine firing event estimator as a difference equation having a plurality of unknown model parameters and a measurement noise factor; utilizing a system identification technique to estimate values for the model parameters; determining a firing event signal using the firing event estimator; and detecting a misfire event using the firing event signal. Applicants submit that Scherer et al. does not disclose or suggest such a method.

Scherer et al. is directed to a device for determining the engine load for an internal combustion engine. In the Official Action mailed March 2, 2005, the Examiner cited Scherer et al. as suggesting a method/system of detecting misfire in an engine that detects engine speed fluctuations (citing to col. 3, lines 1/2 of Scherer et al.), determining a linear model based on the engine speed fluctuations (citing to col. 4, lines 48 – 51 of Scherer et al), and applying a Kalman filter to the linear model to determine parameters of the linear model (citing to col. 2, lines 1 – 12 of Scherer et al.). Applicants discuss below with respect to claims 1, 6 and 7 why Scherer et al. fails to suggest certain of these items. Scherer et al. further does not disclose or suggest simplifying the non-linear, dynamic model of the firing system for the engine by separating it into an engine firing event estimator function and an engine load compensator function and expressing the engine firing event estimator function as a

difference equation having a plurality of unknown model parameters and a measurement noise factor. It thus also fails to disclose determining a firing event signal using the firing event estimator and detecting a misfire event using the firing event signal.

Turning first to Scherer et al., col. 4, lines 48 – 51, which the Examiner cited as disclosing determining a linear model based on engine speed fluctuations, this section of Scherer et al. discloses the use of Kalman filter models to process state variables whose change over time is represented as the sum according to a function which is dependent on the state variable and input values (e.g., engine speed (n), and a stochastic term which takes into account interference variables). Even if this results in a linear model, there is no disclosure or suggestion in Scherer et al. to take this linear model and simplify it by separating it into an engine firing event estimator function and an engine load compensator function. Scherer et al. also fails to disclose or suggest any engine firing event estimator, let alone one that results from the simplification of a nonlinear, dynamic model into an engine firing event estimator function and an engine load compensator function. As such, it also fails to disclose or suggest an engine firing event estimator function that is expressed as a difference equation. For these reasons, applicants submit that new independent claim 11 is allowable over Scherer et al.

New claims 12 – 16 depend directly or indirectly from new independent claim 11, and are allowable for at least that reason.

Turning to claims 1 – 10, claims 1, 6 and 7 are the independent claims. Claims 1 and 6 require, *inter alia*, both determining a linear model for estimating engine firing events based on the engine speed fluctuations and applying a Kalman filter to the linear

model to determine parameters of the linear model. Applicant's submit that contrary to the Examiner's position, Scherer et al. does not disclose both determining a linear model and applying a Kalman filter to that linear model. The Examiner cites to col. 4, lines 48 – 51 of Scherer et al. as disclosing determining a linear model based on the engine speed fluctuations and to col. 2, lines 1 – 12 of Scherer et al. as disclosing applying a Kalman filter to the linear model to determine parameters of the linear model. But these two sections of Scherer et al. are discussing the same Kalman filter. Putting aside the question of whether a Kalman filter results in a linear model, the Examiner's interpretation of Scherer et al. results in the same Kalman filter being used to determine the linear model and then be applied to that linear model to determine parameters of it. Applicants submit that Scherer et al's Kalman filter cannot be both used to determine the linear model and then applied to that linear model to determine parameters of it. Applicants submit that claims 1 and 6 are thus allowable over Scherer et al.

Amended claim 7 requires, *inter alia*, a controller that determines a firing event model for estimating engine firing events based on the speed fluctuations of the engine and applies a Kalman filter to the model to estimate parameters of the model. As discussed with respect to claims 1 and 6, Scherer et al.'s Kalman filter is not used to both determine a model and is then applied to that model to estimate parameters of the model. Applicants submit that amended claim 7 is thus allowable over Scherer et al.

Claims 2 – 5 depend directly or indirectly from independent claim 1 and claims 8 – 10 depend directly or indirectly from amended independent claim 7, and are thus allowable.

CONCLUSION

For the reasons set forth above, applicants submit that claims 1 – 16 and allowable and respectfully request the early notice of their allowance of claims 1 – 16.

Respectfully submitted,

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